

CLAIMS

1. An electronic camera system comprising:

a lens system including at least one lens and having an optical axis
and a focal plane;

a semiconductor sensor array located on said optical axis at said
focal plane of said lens system, said semiconductor sensor array having a plurality
of pixels, each of said pixels generating an output signal that is a function of light
incident thereon;

a sensor control circuit coupled to said semiconductor sensor array
and adapted to produce sensor control signals for controlling an operation of said
pixels in said semiconductor sensor array in response to input from a user of said
camera system;

an addressing circuit coupled to said semiconductor sensor array and
configured to produce a first set of image output signals and a second set of image
output signals from said semiconductor sensor array, said first set of image output
signals being indicative of an intensity of said light at a first set of said pixels
when said sensor control signals are in a first state, said second set of image output
signals being indicative of an intensity of said light at a second set of said pixels

when said sensor control signals are in a second state, said first set of pixels including more said pixels than said second set of pixels;

a storage medium adapted to store a representation of said first set of image output signals when said sensor control signals are in said first state; and

5 a display adapted for displaying said second set of image output signals when said sensor control signals are in said second state.

2. The electronic camera system of Claim 1, wherein said first set of said pixels is a majority of said pixels in said array and said second set of pixels is a preset fraction of said pixels in said array that is less than half of a total of said pixels in said array.

3. The electronic camera system of Claim 2, wherein:

said array is arranged as a plurality of rows and columns of pixels;

and

said second set of pixels comprises pixels from not more than half of said rows and not more than half of said columns of said array.

4. The electronic camera system of Claim 3, wherein not more than half of said rows includes every Nth row and not more than half of said columns includes every Nth column, wherein N is an integer greater than one.

5. The electronic camera system of Claim 1, wherein said semiconductor sensor array is a CMOS sensor array.

6. The electronic camera system of Claim 5, wherein said CMOS sensor array is a vertical color filter CMOS sensor array.

7. The electronic camera system of Claim 1, wherein said storage medium is a semiconductor memory array.

8. The electronic camera system of Claim 1, wherein said storage medium is a magnetic disk storage device.

9. The electronic camera system of Claim 1, wherein said storage medium is an optical disk storage device.

10. An electronic camera system comprising:

a lens system including at least one lens and having an optical axis and a focal plane;

a semiconductor sensor array located on said optical axis at said focal plane of said lens system, said semiconductor sensor array having a plurality of pixels, each of said pixels generating an output signal that is a function of light incident thereon;

a sensor control circuit coupled to said semiconductor sensor array and adapted to produce sensor control signals for controlling an operation of said pixels in said semiconductor sensor array in response to input from an user of said camera system;

an addressing circuit coupled to said semiconductor sensor array and configured to produce a first set of image output signals and a second set of image output signals from said semiconductor sensor array, said first set of image output signals being indicative of an intensity of said light at a first set of said pixels when said sensor control signals are in a first state, said second set of image output signals being indicative of an intensity of said light at a second set of said pixels

when said sensor control signals are in a second state, said first set of pixels including more pixels than said second set of pixels;

a storage medium adapted to store a representation of said first set of image output signals when said sensor control signals are in said first state; and

5 a display adapted for displaying said second set of image output signals when said sensor control signals are in said second state;

a means for computing focus signals indicating a quality of focus of said light from said image output signals when said sensor control signals are in said second state and for generating lens control signals in response to said focus signals; and

focusing control means in said lens system responsive to said lens control signals.

11. The electronic camera system of Claim 10, wherein said first set of said pixels is a majority of said pixels in said array and said second set of pixels is a preset fraction of said pixels in said array that is less than half of a total of said pixels in said array.

12. The electronic camera system of Claim 11, wherein:

said array is arranged as a plurality of rows and columns of pixels;

and

said second set of pixels comprises pixels from not more than half of said rows and not more than half of said columns of said array.

13. The electronic camera system of Claim 12, wherein not more than half of said rows includes every Nth row and not more than half of said columns includes every Nth column, wherein N is an integer greater than one.

14. The electronic camera system of Claim 10, wherein said semiconductor sensor array is a CMOS sensor array.

15. The electronic camera system of Claim 14, wherein said CMOS sensor array is a vertical color filter CMOS sensor array.

16. The electronic camera system of Claim 10, wherein said storage medium is a semiconductor memory array.

17. The electronic camera system of Claim 10, wherein said storage medium is a magnetic disk storage device.

18. The electronic camera system of Claim 10, wherein said storage medium is an optical disk storage device.

19. An electronic camera system comprising:

a lens system including at least one lens and having an optical axis and a focal plane;

a semiconductor sensor array located on said optical axis at said focal plane of said lens system, said semiconductor sensor array having a plurality of pixels, each of said pixels generating an output signal that is a function of integration during an integration time of a signal that is a function of light incident thereon;

a sensor control circuit coupled to said semiconductor sensor array and adapted to produce sensor control signals for controlling an operation of said pixels in said semiconductor sensor array in response to input from a user of said camera system;

an addressing circuit coupled to said semiconductor sensor array and configured to produce a first set of image output signals and a second set of image output signals from said semiconductor sensor array, said first set of image output signals being indicative of an intensity of said light at a first set of said pixels when said sensor control signals are in a first state, said second set of image output signals being indicative of an intensity of said light at a second set of said pixels when said sensor control signals are in a second state, said first set of pixels including more pixels than said second set of pixels;

a storage medium adapted to store a representation of said first set of image output signals when said sensor control signals are in said first state; and

a display adapted for displaying said second set of image output signals when said sensor control signals are in said second state;

exposure detection means for generating an overall exposure signal indicating an aggregate state of exposure of said pixels during said integration time when said sensor control signals are in said first state; and

exposure control means for terminating said integration period in response to said overall exposure signal.

20. The electronic camera system of Claim 19, further including a flash illumination source coupled to said sensor control circuit to be enabled in response to user input and disabled in response to said overall exposure signal.

21. The electronic camera system of Claim 19, further including:

means for computing focus signals indicating a quality of focus of said light from said image output signals when said sensor control signals are in said second state and for generating lens control signals in response to said focus signals; and

focusing control means in said lens system responsive to said lens control signals.

22. The electronic camera system of Claim 19, wherein said first set of said pixels is a majority of said pixels in said array and said second set of pixels is a preset fraction of said pixels in said array that is less than half of a total of said pixels in said array.

23. The electronic camera system of Claim 22, wherein:

said array is arranged as a plurality of rows and columns of pixels;

and

said second set of pixels comprises pixels from not more than half of said rows and not more than half of said columns of said array.

24. The electronic camera system of Claim 23, wherein not more than half of said rows includes every Nth row and not more than half of said columns includes every Nth column, wherein N is an integer greater than one.

25. The electronic camera system of Claim 19, wherein said semiconductor sensor array is a CMOS sensor array.

26. The electronic camera system of Claim 25, wherein said CMOS sensor array is a vertical color filter CMOS sensor array.

27. The electronic camera system of Claim 19, wherein said storage medium is a semiconductor memory array.

28. The electronic camera system of Claim 19, wherein said storage medium is a magnetic disk storage device.

29. The electronic camera system of Claim 19, wherein said storage medium is an optical disk storage device.

30. An electronic camera system, comprising:

- a lens system including at least one lens;
- a semiconductor sensor array optically coupled to said lens system, said semiconductor sensor array having a plurality of pixels arranged in a plurality of rows and columns, each of said pixels generating an output signal that is a function of light comprising an image incident thereon;
- an addressing circuit associated with said semiconductor sensor array, said addressing circuit having a storage addressing mode for generating storage addressing signals to said semiconductor sensor array in which substantially all of said rows and columns of said pixels in said array are addressed and a display addressing mode for generating display addressing signals to said

semiconductor sensor array in which substantially less than all of said rows and columns of said pixels in said array are addressed;

a sensor control circuit coupled to said semiconductor sensor array and to said addressing circuit and operable to produce sensor control signals and addressing circuit control signals for controlling an operation of said pixels in said semiconductor sensor array in response to input from an user of said camera system;

a storage medium coupled to said semiconductor sensor array and operable to store data representing an image sensed by said semiconductor sensor array and presented to said storage medium from said semiconductor sensor array in response to said storage addressing signals; and

a display coupled to said semiconductor sensor array and operable to display data representing an image sensed by said semiconductor sensor array and presented to said display from said semiconductor sensor array in response to said display addressing signals.

31. The electronic camera system of Claim 30, wherein said addressing circuit addresses fewer than half of said rows and columns of said pixels in said array in said display addressing mode.

32. The electronic camera system of Claim 30, wherein said addressing circuit addresses pixels from not more than half of said rows and not more than half of said columns of said array.

33. The electronic camera system of Claim 32, wherein not more than half of said rows includes every Nth row and not more than half of said columns includes every Nth column, wherein N is an integer greater than one.

34. The electronic camera system of Claim 33, wherein N is equal to 4.

35. The electronic camera system of Claim 30, wherein said semiconductor sensor array is a CMOS sensor array.

36. The electronic camera system of Claim 35, wherein said CMOS sensor array is a vertical color filter CMOS sensor array.

37. The electronic camera system of Claim 30, wherein said storage medium is a semiconductor memory array.

38. The electronic camera system of Claim 30, wherein said storage medium is a magnetic disk storage device.

39. The electronic camera system of Claim 30, wherein said storage medium is an optical disk storage device.

40. An electronic camera system comprising:

- a lens system including at least one lens;
- a semiconductor sensor array optically coupled to said lens system,

said semiconductor sensor array having a plurality of pixels arranged in a plurality of rows and columns, each of said pixels generating an output signal that is a function of light comprising an image incident thereon;

an addressing circuit associated with said semiconductor sensor array, said addressing circuit having a storage addressing mode for generating storage addressing signals to said semiconductor sensor array in which substantially all of said rows and columns of said pixels in said array are addressed and a display addressing mode for generating display addressing signals to said semiconductor sensor array in which substantially less than all of said rows and columns of said pixels in said array are addressed;

a sensor control circuit coupled to said semiconductor sensor array and to said addressing circuit and operable to produce sensor control signals and addressing circuit control signals for controlling an operation of said pixels in said semiconductor sensor array in response to input from an user of said camera system;

a storage medium coupled to said semiconductor sensor array and operable to store data representing an image sensed by said semiconductor sensor array and presented to said storage medium from said semiconductor sensor array in response to said storage addressing signals;

a display coupled to said semiconductor sensor array and operable to present display data representing an image sensed by said semiconductor sensor

array and presented to said display from said semiconductor sensor array in response to said display addressing signals;

a focus-signal computing circuit configured to receive said display data from said semiconductor sensor array in response to said display addressing signals and to compute focus signals indicating a quality of focus of said image and for generating lens control signals in response to said focus signals; and

focusing control apparatus in said lens system coupled to and responsive to said lens control signals.

41. The electronic camera system of Claim 40, wherein said addressing circuit addresses fewer than half of said rows and columns of said pixels in said array in said display addressing mode.

42. The electronic camera system of Claim 40, wherein said addressing circuit addresses pixels from not more than half of said rows and not more than half of said columns of said array in said display addressing mode.

43. The electronic camera system of Claim 42, wherein not more than half of said rows includes every Nth row and not more than half of said columns includes every Nth column, wherein N is an integer greater than one.

44. The electronic camera system of Claim 43, wherein N is equal to 4.

45. The electronic camera system of Claim 32, wherein said semiconductor sensor array is a CMOS sensor array.

46. The electronic camera system of Claim 45, wherein said CMOS sensor array is a vertical color filter CMOS sensor array.

47. The electronic camera system of Claim 40, wherein said storage medium is a semiconductor memory array.

48. The electronic camera system of Claim 40, wherein said storage medium is a magnetic disk storage device.

49. The electronic camera system of Claim 40, wherein said storage medium is an optical disk storage device.

50. An electronic camera system comprising:

a lens system including at least one lens;

a semiconductor sensor array optically coupled to said lens system, said semiconductor sensor array having a plurality of pixels arranged in a plurality of rows and columns, each of said pixels generating an output signal that is a function of integration during an integration time of a signal that is a function of light comprising an image incident thereon;

an addressing circuit associated with said semiconductor sensor array, said addressing circuit having a storage addressing mode for generating storage addressing signals to said semiconductor sensor array in which substantially all of said rows and columns of said pixels in said array are addressed and a display addressing mode for generating display addressing signals to said semiconductor sensor array in which substantially less than all of said rows and columns of said pixels in said array are addressed;

a sensor control circuit coupled to said semiconductor sensor array and to said addressing circuit and operable to produce sensor control signals and addressing circuit control signals for controlling an operation of said pixels in said semiconductor sensor array in response to input from an user of said camera system;

a storage medium coupled to said semiconductor sensor array and operable to store data representing an image sensed by said semiconductor sensor array and presented to said storage medium from said semiconductor sensor array in response to said storage addressing signals;

a display coupled to said semiconductor sensor array and operable to present display data representing an image sensed by said semiconductor sensor array and presented to said display from said semiconductor sensor array in response to said display addressing signals.

said semiconductor sensor array configured to generate an overall exposure signal indicating an aggregate state of exposure of said pixels during said integration time and including an exposure control circuit for terminating said integration period in response to said overall exposure signal.

51. The electronic camera system of Claim 50, further including a flash illumination source coupled to said sensor control circuit to be enabled in response to user input and disabled in response to said overall exposure signal.

52. The electronic camera system of Claim 50, further including:

a focus-signal computing circuit configured to receive said display data from said semiconductor sensor array in response to said display addressing signals and to compute focus signals indicating a quality of focus of said image and for generating lens control signals in response to said focus signals; and

focusing control apparatus in said lens system coupled to and responsive to said lens control signals.

53. The electronic camera system of Claim 50, wherein said addressing circuit addresses fewer than half of said rows and columns of said pixels in said array in said display addressing mode.

54. The electronic camera system of Claim 50, wherein said addressing circuit addresses pixels from not more than half of said rows and not more than half of said columns of said array in said display addressing mode.

55. The electronic camera system of Claim 54, wherein not more than half of said rows includes every Nth row and not more than half of said columns includes every Nth column, wherein N is an integer greater than one.

56. The electronic camera system of Claim 55, wherein N is equal to 4.

57. The electronic camera system of Claim 50, wherein said semiconductor sensor array is a CMOS sensor array.

58. The electronic camera system of Claim 57, wherein said CMOS sensor array is a vertical color filter CMOS sensor array.

59. The electronic camera system of Claim 50, wherein said storage medium is a semiconductor memory array.

60. The electronic camera system of Claim 50, wherein said storage medium is a magnetic disk storage device.

61. The electronic camera system of Claim 50, wherein said storage medium is an optical disk storage device.

62. A method for operating an electronic camera comprising:
placing an image on a semiconductor sensor array having a plurality of rows and columns of pixel sensors disposed thereon;

addressing a first group of said pixels on said semiconductor sensor array, said first group of pixels comprising substantially less than all of said rows and columns of said pixels in said array, to obtain display data;

displaying said display data on a display associated with said electronic camera;

sensing an image-capture request made by a user; and

addressing a second group of said pixels on said semiconductor sensor array, said second group of pixels comprising substantially all of said rows and columns of said pixels in said array to obtain image-storage data, and storing

said image-storage data in a storage medium associated with said electronic camera data in response to said image-capture request.

63. The method of Claim 62, wherein:

addressing said first group of said pixels on said semiconductor sensor array comprises addressing selected ones of said rows and columns of said pixels on said semiconductor sensor array; and

addressing said second group of said pixels on said semiconductor sensor array comprises addressing substantially all of said rows and columns of said pixels on said semiconductor sensor array.

64. The method of Claim 63, wherein addressing selected ones of said rows and columns of said pixels on said semiconductor sensor array comprises addressing pixels comprises pixels from not more than half of said rows and not more than half of said columns of said array in said display addressing mode.

65. The method of Claim 64, wherein not more than half of said rows includes every Nth row and not more than half of said columns includes every Nth column, wherein N is an integer greater than one.

66. The method of Claim 65, wherein N is equal to 4.

67. The method of Claim 62, further including;

computing a focus metric from said display data; and

adjusting a focus of said image on said semiconductor sensor array in response to said focus metric.

68. The method of Claim 62, further including:

setting said pixels in said array to a known state and then integrating signals on said pixels in said array during an integration time, said signals being a function of a light received by said pixels in response to said image-capture request;

generating an overall exposure signal indicating an aggregate state of exposure of said pixels during said integration time; and

terminating said integration period in response to said overall exposure signal.

69. The method of Claim 68, further including:

5 initiating flash illumination from a flash illumination source associated with said electronic camera in response to said image-capture request; and

terminating said flash illumination in response to said overall exposure signal.